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*J. D. Meredith Reed, L.L.D.
With D. Harris's request*

STILENTIAL DISEASES,
AND THE
LAWS WHICH GOVERN THEIR PROPAGATION.
-A LETTER
FROM
ELISHA HARRIS, M. D.,
LATE PHYSICIAN-IN-CHIEF OF THE NEW YORK QUARANTINE HOSPITAL,
IN REPLY TO INQUIRIES ADDRESSED BY THE
QUARANTINE COMMISSIONERS.

Transmitted to the Legislature by the Governor, March 10, 1858.

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CHARLES VAN DENTHUYSEN, PRINTER.
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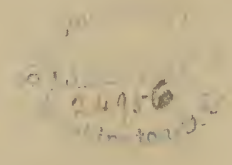




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STATEMENT

Of ELISHA HARRIS, M. D., *in reply to inquiries from the Quarantine Commissioners.*

To the HON. GEO. HALL, EGBERT BENSON and OBADIAH BOWNE,
Commissioners for the removal of the Quarantine station :

Gentlemen: I have the honor to acknowledge the receipt of your communication of the 18th inst., soliciting a reply to certain important questions relating to those natural laws which are believed to govern the transmission and diffusion of infectious diseases.

A proper solution of the several queries which you have proposed, necessarily involves an examination of the very basis of the theory and practices of Quarantine.

Fully appreciating the importance of the questions submitted, and earnestly desiring to make only such statements as will embody the most essential facts, and incontrovertibly abide the tests of experience and rigid investigation, I will briefly reply to those queries as follows :

1st. "To what forms or classes of infectious diseases, as determined by medical science and observation, should the Quarantine restrictions of the port of New-York be expected to apply, and what general facts relating to each need to be provided for, in the arrangements of a Quarantine establishment for this port?"

The theory of all rational Quarantine restrictions being necessarily and entirely based upon the fact that certain diseases are capable of being propagated by means of materials or media that are liable to be transported, or in some manner transmitted from place to place, or from person to person, and thereby become widely epidemic, the public safety, as well as the tran-

quility of the public mind, the prosperity of business, and the interests of commerce, manifestly require that the line of distinction be accurately, or at least definitively drawn between the non-infectious and the infectious diseases which are liable to be conveyed from abroad to the Port of New-York. That it may sometimes be difficult to determine such distinctions with perfect exactness, must be sufficiently evident to all who have intelligently and faithfully studied the great laws of disease, and the ever-varying conditions of the physical world, and of human health. Hence many of the conflicting opinions and statements respecting *infection* and *contagion*, in the diffusion or propagation of various maladies.

Yet enough is *certainly known* of the nature and the distinctive characteristics of the more important forms of disease, to enable us to define certain limits of safety and of danger to our communities, from those causes of disease that are transmissible from place to place, or from person to person, as in the case of small pox. Upon the correctness of such approximative determinations, great interests of the public health are made to depend.

The practice of sanitary restrictions respecting diseases believed to be contagious or infectious, is as ancient as the history of leprosy and the plague; but having generally been based upon empirical dogmas, the ancient, like many of the modern regulations of Quarantine, have too often been found alike useless and absurd.

But with the progress of accurate and scientific knowledge respecting the various maladies that afflict the human race, the number of diseases believed to be transmissible by contagion and infection, has been gradually diminished, until only a very few remain such objects of certain danger, or of such suspicion and dread in communities, as to require, or even justify the ordinary restrictions of Quarantine.

Of those few pestiferous and infectious diseases, only the small pox, typhus or ship fever, cholera, and yellow fever, have ever been, or are ever likely to be sources of danger to the city

and vicinity of New-York, by transportation hither from other places. Each of these four maladies has at various times become epidemic in our city and its vicinity.

Small pox.—It is well known that this disease is seldom communicated to persons beyond the apartment in which it exists; but its virus may be conveyed and become active in places at any distance from its starting point; yet this can occur only by actual contact, or very near approach to the fomites of infection. In the open air the virus of small-pox is rapidly and completely dissipated and destroyed. The instances are rare in which such infection has been transmitted many yards.

Under certain circumstances, when this malady is prevailing as an epidemic, its germs may doubtless be diffused to a much greater distance than under ordinary atmospheric conditions; but the greatest distance to which the infection of small-pox has been thus diffused, has probably never exceeded five hundred yards. Indeed, we know of only a single instance on record, in which the infection has been presumed to have propagated itself at that distance.

The perfect disinfection of all materials capable of transmitting this loathsome malady, is comparatively easy and very certain; thorough ventilation and cleansing being the only requisites. And in addition to these means of security, we have the great discovery of vaccination, by which all persons may be immediately protected.

These various considerations enable us to regard small pox as being more completely within our control than any other of the contagious and infectious diseases. Indeed, were proper attention given to vaccination, small pox might be struck from the catalogue of diseases requiring the detention of vessels and cargoes at Quarantine.

Judging from all that is known of the history of this malady and its propagation, it is safe to conclude, gentlemen, that you will secure to the communities near the Quarantine station, complete protection from this ever present and most dreaded infec-

tion of such an establishment, by securing for the Lazaretto and the Quarantine anchorage, a location where the winds and sea breezes have unobstructed sweep, if situated at the distance of half a mile from the shores, and a like distance from the ordinary track of vessels.

Typhus or ship-fever.—As regards the infectious nature of ship fever, there can be no doubt that it has the property of reproducing the specific poison or virus upon which it depends, and by which it may very readily be communicated for a short distance from the sick person. It is well known, also, that this virus may be absorbed by, or adhere to, material substances, thus constituting them fomites capable of conveying the exciting cause of the fever from place to place.

But whatever may be the nature of this poison, it may be easily rendered inoperative by free ventilation for a few hours, or by proper cleansing. Typhus can not be considered as a specifically infectious malady when *and where an abundance of fresh air is constantly supplied and proper cleanliness observed.* The transmission or extension of this fever seems to depend upon a certain degree of *concentration* or accumulation of the virus of infection, or of the atmosphere specially vitiated by the fever or its causes. Hence, the presence of this disease at Quarantine can not be considered as a source of danger to any community, if the sick are suitably provided for on their arrival at Quarantine, and the infected vessels and materials are properly ventilated or disposed of.

All the fomites of typhus infection may, and should be rendered perfectly innocuous within forty-eight hours after arrival at the Quarantine station.

As in the case of small pox, the nature of the infectious poison, and its mode of propagation, would not require the vessels importing the infection to be detained at anchor very far from the limits of the city, were it not for the fact that near proximity to a populous town might tempt illicit intercourse with such sources and centres of infection. Neither of these maladies need ever be transmitted from the hospitals and stores at Quarantine,

and under proper management of such an establishment, these diseases will not be propagated from it.

Asiatic cholera.—The nature and the causes of cholera are acknowledged to be imperfectly understood; and, next to yellow fever, it has been the cause of the greatest differences of opinion respecting the theory and practices of Quarantine, both in Europe and America; courting and desolating, first and principally, the abodes of poverty, vice, and filth, this pestilence appears mainly to owe its propagation to such unwholesome conditions; though the germs of the malady are known to have been transmitted originally from Asia, either by atmospheric or by human agencies. On its first appearance in European countries, sanitary cordons were every where instituted, and the injunctions of non-intercourse were rigorously enforced; but the terrible pestilence, steadily, and with post-like regularity, advanced to the westward. Though its path of progress has always appeared to be directly in the great thoroughfares of commerce, its ways have hitherto eluded the search, and mocked the control of all *cordons sanitaires*. It has seemed securely to have planted its deadly germs far in advance of all sanitary precautions, until it has visited repeatedly the great marts of trade, and traversed with fatal steps the principal cities of commercial intercourse. In the light of such experience, what can avail Quarantine restrictions in staying the advance of cholera to this continent, and to our Port? We answer, perhaps much, positively something.

It is not generally known to our citizens, that repeatedly during the last four years, at times when our city, and the whole country, have been completely free from Asiatic cholera, that fearful malady has been conveyed in ships to the present Quarantine station, and that from the cholera wards, (or by an un-supposable coincidence,) the most virulent form of that malady has spread as an endemic in the various hospital buildings there. A very recent instance of this kind, when this disease (by importation from Hamburgh and Bremen) swept off at one sudden outburst, some twenty patients, of all classes, from the wards nearest the cholera hospital. These endemics of cholera have

not originated from any of those local causes to which that disease is usually attributed, for none such exist upon the Quarantine grounds.

I am happy to state that there is no evidence that this malady has ever been spread directly from the hospitals to the populous village that surrounds them. Hence we may infer that whatever be the nature and sources of the infection, it does not necessarily become very widely diffused without the aid of human agencies.

In the light of such experience, which finds ample confirmation in the history of cholera in all parts of the world, some Quarantine restrictions respecting cholera patients and their clothing, seem to be fully warranted.

Though there is nothing *known* which can be considered as demonstrating that vessels and merchandise can become infected carriers of the cholera poison, it is manifestly expedient that all vessels arriving in port with passengers sick with cholera should at least be thoroughly cleansed and ventilated before approaching near to the city. The terrible uncertainty that exists with reference to the agencies by which the cholera has been transmitted from the Eastern continent to the American shores warrants the precautionary measures here suggested, and indicates the expediency of having such vessels and their sick arrested and properly provided for at the remotest practicable point from the city and its populous environs. But there is no reason for believing that the lazaretto for cholera would be a source of danger to any community at the distance of one mile.

As in the case of ship-fever and small pox, the grand points to be attained are the perfect ventilation and cleansing of the vessels and their passengers, and the securing of temporary and complete isolation for those processes of disinfection.

Yellow fever.—As the oriental plague has been for centuries the pestilence most feared and most carefully guarded against in the cities of the eastern continent, so has the yellow fever been the scourge most dreaded and most anxiously sought to be

averted from the tropical islands and the maritime cities of the western world. Most of our Quarantine regulations owe their origin to this tropical scourge.

Though the sources of this deadly fever, and the agencies by which its infection is propagated, yet remain somewhat obscure and doubtful, enough is known of its history to give the following conclusions the highest degree of certainty :

1st. The infection of yellow fever has been repeatedly conveyed to the port of New-York by vessels from southern and West-India ports, when, and only when, that malady has been prevalent in those ports of departure, and no case of that fever has occurred in New-York during the present century, except at such times.

2d. Whatever may or may not have been true respecting the domestic origin of the earlier epidemics of yellow fever in New-York, and whatever may still be true of the *possibility* of domestic sources of the fever in our midst, we may safely assert that, for the last forty years, yellow fever has occurred in the city and vicinity of New-York only as the result of a direct importation of the infection or virus of that fever from southern ports.

3d. All vessels from ports in which yellow fever is epidemic at the time of their departure with their cargoes, are liable to convey the infection of that fever, and should therefore be subject to such Quarantine regulations as will perfectly secure the public health from any danger therefrom.

4th. The accumulation of a large amount of infected materials without complete ventilation, or the close aggregation of a large number of infected vessels with their cargoes, in the absence of other ventilation than that attainable by the usual means on shipboard, would, during any of the summer months, constitute a *pest embankment*, dangerous to all persons and vessels coming in near proximity thereto. Therefore we must conclude that a safe anchorage, completely removed from the track of other vessels and the ordinary paths of commercial intercourse, with ample provisions and appliances for securing the

storage and complete ventilation of cargoes, etc., constitute most essential requisites for a Quarantine establishment.

5th. The *lighterage* of cargoes directly from infected vessels to the city, or elsewhere, should be prohibited, and in its stead a commodious warehouse system should be provided near the anchorage, on the most isolated portion of the Quarantine grounds. To those warehouses all cargoes should be transferred from infected vessels, immediately after arriving; and all such vessels, after a brief detention for cleansing, might safely be allowed to return to the ports whence they sailed; or they might proceed to ports far north. Large numbers of vessels, supposed to be infected, should never be anchored in close proximity to each other, as they might diffuse and perpetuate an epidemic atmosphere.

6th. Packages of merchandise, and materials most liable to retain the infection, should not be transferred from the Quarantine warehouses until the occurrence of frost, unless some means for perfect disinfection be efficiently applied; yet, under such circumstances, the goods might safely be on sale in market, by *samples* specially disinfected by artificial cold—a measure that would at once relieve merchants from all anxiety, and from all expenses and losses on goods in Quarantine.

In reply to the several special questions that you have requested me to answer respecting the propagation of yellow fever, the following facts are respectfully submitted:

2d. "Has yellow fever ever spread from the hospital enclosure on Staten Island to the surrounding neighborhood?"

In reply to this question, it should be stated, that although the Quarantine hospital has been established at its present location for the past 59 years, and although during that period there have been admitted to that institution in 45 of those several years, one thousand and fifty-nine patients sick with yellow fever, a single case of that malady never has occurred on Staten Island, outside the walls of the Quarantine enclosure, that could, upon any rational grounds, be attributed to the air from the hospitals, or the patients. Beyond this, we may state that,

notwithstanding the fact that the government storehouses for infected goods have always been located within the Quarantine enclosure, and have frequently been filled with the cargoes from infected vessels, the entire history of yellow fever on Staten Island furnishes but two or three instances in which it appears in the least probable that the infected air from those storehouses has been diffused therefrom to persons beyond the Quarantine wall, and in such instances the distance has been less than 200 yards.

3d. "Has the yellow fever, or any other epidemic disease, ever spread from the shipping in Quarantine to the shore?"

Yellow fever is probably the only disease which has ever been transmitted from infected vessels and cargoes, directly through the air, to persons on the shores opposite the Quarantine anchorage. We will refer to a few instances in which the evidences of such atmospheric transmission of the yellow fever infection are incontrovertible.

The epidemic of 1856.—The terrible visitation of yellow fever to the Fort Hamilton and Bay Ridge district, on the Long Island shore, occurred under circumstances which afford unequivocal evidences that the breath of pestilence was swept directly from the infected vessels in Quarantine, to the delightful ~~hott~~^{hous}es dotting the beautiful slopes of that bay side along the Narrows.

A score of infected vessels in Quarantine had opened their pestilential hatches, and several ships were discharging cargo that was saturated with infected air from ports where yellow fever was prevalent.

The soft, south wind, loaded with moisture, had for several days been sweeping directly over those open vessels and cargoes towards the elegant abodes of wealth and refinement on the shore, distant only from 500 yards to a mile, when suddenly the work of death commenced, and without distinction, the affluent and the poor, the old and the young, were cut down together.

A careful investigation of the history of each individual case, of the large numbers that occurred in that remarkable epidemic,

has driven from my mind the last doubt of exclusively atmospheric agency in transmitting the germs of that fatal fever from the vessels to the shores.

On the Staten Island shore, opposite the Quarantine anchorage, the fever did not appear, except within and very near the hospital enclosure, and at the remote village of Clifton, opposite to Fort Hamilton, and near the anchorage for the infected vessels. The winds had not been from the direction of the anchorage, nor were the most infected vessels near the Staten Island shore.

Yellow fever on Staten Island in 1848.—It is well known that among the physicians and residents on Staten Island there has been but one opinion respecting the origin of that fearful epidemic that visited the villages of Stapleton and Tompkinsville in the year 1848. Several vessels, known to be infected, were discharging cargo or lying at anchor at various points within a quarter of a mile from the shore and opposite those villages.

In a large proportion of the families that were visited by the fever, there was positive evidence that none other than atmospheric agencies communicated the disease to their dwellings. It was observed also, that the infection was transmitted in a straight, and not very widely diffused path, from the infected vessels. A large tree with dense foliage, or a building intervening between the vessel and a dwelling on shore, was found to afford complete immunity from infection. No facts could be more significant than these.

Yellow fever in 1821.—On the 3d of September, 1821, a violent storm drove thirty vessels upon the Staten Island shore, near the hospital, several of which were wrecked. Previously to that period, a quantity of infected goods had been landed at the Quarantine warehouses, but in no instance had the yellow fever been communicated from them; yet, immediately after the storm, that malady made its appearance in a malignant form, among the population on shore. It is an interesting fact, that during that epidemic, no cases of the fever occurred that were not traced to an exposure within a distance of less than 1,500

feet; and Dr. Bailey, the Health Officer at that time, was confident that each individual case could be traced to personal exposure within less than 250 feet from infected vessels or infected goods.

First Epidemic of Yellow Fever on Staten Island.—In the year 1799, when the population of the island was very sparse, twenty-five persons living near the shore at Quarantine, were attacked with the fever, and of that number one only recovered. At that time there was a large amount of infected shipping anchored at the Quarantine station. Previous to that year, Bedloe's and Governor's Islands had been occupied as the most distant Quarantine stations.

“4. Does or does not experience warrant the belief that yellow fever is conveyed by the wind from point to point?”

Though there is no doubt that the infection of yellow fever has often been transmitted from point to point, over both land and water, we do not yet possess the means for deciding with absolute certainty that it is by the sole agency of currents of air that the virus of infection is conveyed; but it may be considered fairly a matter of just inference, from what has been observed of the progress of this fever from place to place. In the instances just narrated, the infection was unquestionably transmitted through and by the atmosphere, without the intervention of human agencies; but there is no positive evidence that any of those infected places actually imparted similar infection by transmission to other points. But in our southern States, and in most places where the fever extends as an epidemic, it is usually observed that the disease progresses by slow and distinct gradations from point to point, and in such manner as distinctly to indicate that each new point reproduces and diffuses its own infection. The history of several of the epidemics in our own city strongly indicates, if it does not prove, that the infection of yellow fever has, even in our less favorable climate, reproduced or multiplied and diffused itself, as the march of the epidemic has advanced from point to point, and from street to street. We would briefly refer to the facts observed in the epidemic of 1822, when the fever prevailed in the most salubrious and fashionable

quarter of the city. Originating most unquestionably from infected merchandise and vessels, near the foot of Rector street, the germs of infection therefrom were first developed at No. 26 in that street, about the tenth of July. By very slow and distinct steps the fever progressed towards Broadway.

So tardily did the pestilence advance, that even the board of health, with apparent indifference, declined to take any notice of it during the first twenty days of its progress.

Up to August 24th, only eighty cases had been reported, and at that date the destroyer had only advanced as far as the head of Wall street, a distance of about three blocks. It is true that previous to this date, cases of the fever had been reported in all parts of the city; but all such cases were known to have contracted the fever while in or very near Rector street.

In no instance did cases beyond the infected district reproduce the infection. But a load of chests and clothing having been clandestinely, or at least imprudently transferred from the infected district to Lombardy (now Munroe) street, a distinct and new centre of infection was at once formed, and from it the fever was diffused and reproduced in several adjacent streets, but the two infected districts never coalesced. After repeated advances of the fever, and consequent evacuation of the dwellings by the people, and the repeated shifting of the barricades from street to street, as the radius of infection extended, the breath of pestilence was destroyed by frost, ere it had desolated the streets north of the City Hall in the "lower district," or beyond Catharine, Division and Pike streets in the "upper district." The latter district had a diameter of about one-fourth, and the former of about three-fourths of a mile.

At the close of the epidemic, it was ascertained that the nearest approximation of the two districts was only half a mile.

5th. "What is the greatest distance from the seacoast that the yellow fever has ever been known to spread inland?"

Yellow fever has prevailed as an epidemic at Memphis, Tenn. as well as at most other towns on the Mississippi river, between the

Gulf of Mexico and that city. Memphis is situated six degrees of latitude north of the Balize, or about 400 miles from the sea in a direct line, though 900 miles by the course of the river. This, probably, is the most distant point inland at which the yellow fever has ever become epidemic. But it should be observed that Memphis is virtually a maritime town, being on the banks of the Mississippi, the surface of which, at that point, is only 230 feet above the level of the sea. The same may be said of Montgomery, Ala., and of many other inland towns throughout the Southern States; and particularly in the southern and eastern provinces of Spain such transmission has frequently been observed.

In the city of Seville, on the river Guadalquiver, 24 leagues from the sea, the yellow fever has repeatedly prevailed with fearful fatality, when the malady has been epidemic in the nearest ports. So at Cordova, which is distant 70 miles from the sea in a direct line; and in many other towns in Andalusia.

With regard to places remote from water communication, there certainly have been numerous instances in our Southern States, as well as in Mexico and in Spain, where yellow fever has prevailed as an epidemic; but in all those instances, the localities are situated near the level of the sea, and the epidemic has uniformly made its appearance in connection with direct intercourse with towns known to be suffering under that dreaded visitation.

The march of yellow fever with post-like regularity from town to town, near the level of the sea, and in the vicinity of ports, warrants the conclusion that if it should hereafter become epidemic in the city of New-York, all the large towns in the vicinity of our city would be liable to share in the pestilential visitation.

No human agencies short of the most vigorous non-intercourse, could insure the protection of the suburban towns, when once an epidemic of yellow fever becomes extensively prevalent in New-York, "so constant and varied are the intercommunications

now carried on between the cities and villages that cluster in the vicinity of this port." It should be borne in mind, that the intercourse of these places with our city, is essentially different from that which existed at the time of the great epidemics in 1795, 1798, and 1799, and of those very limited ones of 1819 and 1822.

But the distance to which the infection of yellow fever in our latitude has ever been transmitted inland, independently of commercial and human agencies, is very limited. We have no proofs of its ever having spread to the distance of a mile from the shore, at one stride, by atmospheric agencies alone. On the Long Island shore, in 1856, it extended but a few hundred yards inland, notwithstanding the presence of the pest-embankment that was anchored near by in the bay.

6th. "What, in your opinion, is the shortest distance from land, at which vessels infected with yellow fever may ride at anchor, without danger of communicating that fever to the adjoining shores?"

The exact distance to which the infected air from shipping, cargoes, etc., may be transmitted through a healthy atmosphere, has never been clearly established; and from the complexity and ever varying character of the conditions upon which such transmissions depend, the precise limits of perfect security, or of danger, can never be absolutely defined.

In all precautionary measures for the protection of the public health, a wide margin should be allowed between the most distant point of danger known, and the nearest point of safety experienced. That margin of uncertainty cannot properly be less than one mile, on land, and quite as much on water, adjacent to any shore with a southerly exposure. To this margin of uncertainty we must add the radius of known liability to infection from such vessels. That radius or distance, is probably as great in the harbor of New-York as in any other northern port.

Unless we admit that the yellow fever is personally contagious, or, on the other hand, that it is of domestic origin among us, neither of which hypotheses is tenable, we ~~are~~^{are} forced to the

conclusion, that in the summer of 1856, the infection of yellow fever was transmitted to distances, varying at various points, from five hundred yards, as opposite the residence of the lamented Chandler White, to a considerably greater distance, but probably in all cases within a radius of one and a half miles, as at the various points of infection, by the water-side, both north and south of Mr. White's residence.

We should mention in this place, that notwithstanding the surmises entertained by the army surgeons on Governor's Island, that the infection which invaded the garrison at that station had possibly been wafted directly from the vessels anchored at Quarantine, at a distance of four or five miles; careful investigations have led to the conclusion that the epidemic reached that island directly and only from the Quarantine lighters and lighter loads of goods from infected vessels. These open boats passed up to the Atlantic docks, and were daily and nightly moored in the narrow channel by which Governor's Island is separated from the government warehouses in which were deposited the immense quantity of merchandise that was lightered from the infected shipping at Quarantine.

We have good reasons for believing that while with a northerly wind, and its uniform atmospheric concomitants in respect to temperature and humidity, the infection of yellow fever, in our latitude, has probably never been transmitted through the air to the distance of a single mile: yet a southerly wind, in conjunction with a high temperature and excessive humidity, may convey infection to an indefinite and certainly much greater distance. Personally, we should prefer to take the risk of an exposure to infection transmitted by northerly winds, from an infected place one mile distant, rather than incur the hazard of exposure at the distance of five miles to the north from such a place, with a heated south wind wafting directly from it the germs of pestilence in an atmosphere saturated with moisture.

7th. "Has a strong sea breeze any perceptible effect in ameliorating the violence of yellow fever?" We reply unhesitatingly in the affirmative. The proofs are very abundant and

decisive in the records of yellow fever epidemics in all ports where the malady has prevailed; and in land-locked or mountain shielded ports, the epidemics of this fever are frightfully malignant and uncontrollable.

The details relating to this subject are exceedingly instructive, but the limits of this letter will not permit a discussion of them here.

8th. "Do you know of any points in the-West Indies, similar in their general features to Sandy Hook, which are measurably exempt from yellow fever, and if so, to what cause do you attribute such exemption?"

Several such well known points in some of the West India islands, might be mentioned; we need only refer to a few of them. The island of Jamaica has long been one of the most noted for the general unhealthiness of its ports, which are principally upon its southwestern border. The harbor of Kingston is a bay formed by two low projections of land known as Port Royal and Port Augusta, the former being about ten miles in length, and the latter somewhat less, and each peninsula, particularly the latter, is very freely exposed to the unobstructed sweep of the sea breezes. Port Augusta, which is four miles from Kingston, has a relative position much like Sandy Hook. Two miles north of Kingston is a delightful locality, on a southerly slope, known as Up Park Camp. It is as well sheltered by hills from behind as is the eastern shore of Staten Island, opposite the Narrows.

The fatality of yellow fever at that station has always been very great. Out of 14,520 soldiers stationed there, with superior accommodations, 2,042 have died during twenty years. It has often been necessary to remove the troops from that place, on account of the ravages of yellow fever there; while Port Augusta, which is on the level of the sea, and only six miles distant from Up Park Camp, has lost less than one half as large a proportion of its soldiers, and more than half of those were from the sick sent down from Kingston.

Port Augusta is decidedly one of the healthiest stations on the shores of Jamaica, though it is surrounded by and is very near to the most sickly places. Yellow fever rarely occurs there. The same may be said of Fort Charlotte, Falmouth, and Port Royal, all of which are situated on narrow and low peninsulas, which are continually swept by sea breezes, unobstructed by neighboring elevations. Against these and many like instances of salubrity, we have the history of frightful and constantly recurring ravages of yellow fever, in those ports and stations that are not fully exposed to the sea breezes, or that are sheltered by elevations to the leeward, as at Up Park Camp, already referred to, at St. Antonio, which is surrounded by an amphitheatre of hills, and Savannah La Mar, which is situated on the beach, protected by high elevations in the rear. At this place, a single epidemic has swept off two thirds of all the troops.

We would also mention the port of St. Thomas, W. I., a place in sad repute as a favorite habitat of the yellow fever. The epidemics of this malady so frequently recurring in the city and harbor of St. Thomas, are characterised by an awful fatality, and the town cannot be entered by foreigners and unprotected persons at such periods without imminent danger of contracting the fever; and patients stricken with that malady, unless speedily removed from the city, have very doubtful chances of recovery. Yet, at the distance of little more than a mile to the southward of the city, there are two localities thickly populated, where cases of yellow fever have but very rarely occurred, and whither the inhabitants of the city flee for sanitary protection. These places of security are the two narrow peninsulas by which the harbor of St. Thomas is formed; and which, like Sandy Hook, are constantly fanned by the fresh sea breezes.

On the southwesterly arm or peninsula are two forts and a telegraph station, and this locality, though only about a mile from the city, and always densely populated, is regarded as one of the most salubrious points in the West-India islands.

It will be recollected that the island of St. Thomas is a narrow volcanic ridge, about eight miles, by a mile and a half, and having an altitude of nearly one thousand feet above the level of the sea, and that its city and port are situated in an amphitheatre, and would be completely land-locked but for the opening southward between the two peninsulas before mentioned.

Havana, also, is a land-locked port, being surrounded by lofty hills, with only a very narrow outlet to the sea; and from this peculiarity of its topography, mainly arises its unhealthy character. The same is also true of Rio Janeiro, where the yellow fever has recently prevailed with such fearful fatality. So of Gibraltar, where the fever has often become epidemic. The town of Gibraltar may be said to be completely protected from the winds which prevail during the sickly season. It is built upon the narrow base of the west side of the rock, which extends for three miles from north to south, and whose impregnable front is reared to an altitude of about 1,400 feet, completely obstructing the sweep of winds from the Mediterranean, ('the levanters') which prevail during the autumn. The epidemics have always extended their ravages along that sheltered western base of the great rock; while at either extremity, where the breezes and winds are very constant and powerful, have always been found the places of greatest security from the fever. *Unobstructed ventilation*, in all these instances, has manifestly been the principal cause of the remarkable salubrity enjoyed.

There is every reason for believing that had not the Fort Hamilton district, during the prevalence of the epidemic there in 1856, enjoyed the advantage of a tolerably free sweep from the prevailing winds, the pestilence would have made its way much farther inland; yet an easterly or northeasterly wind constantly prevailing, might have entirely protected those westerly and southerly slopes from the infection, as may be fairly inferred from the immunity enjoyed on the leeward, or Staten Island shore. There appears to be abundant evidence that, while the winds and prevailing breezes aid in the transmission of yellow fever infection, the same agencies serve also to dissipate the virus, probably by attenuation, so as to render it innocuous,

except in cases where a dense population intervenes and furnishes *new centers*, from which freshly generated or reproduced infection may be diffused.

9th. "Would the objections which apply to the present Quarantine station, be applicable to Sandy Hook?"

In my judgment, both Sandy Hook and all its surroundings, are entirely free from all the objections which apply peculiarly to the present Quarantine station. The essential points of difference are perhaps sufficiently indicated by the statements of general facts in the preceding pages, as well as by what is generally known of the relative features of the topography of the two localities. But we would submit the following remarks, first stating what must be considered to constitute the essential requisites for a really protective Quarantine establishment to guard against yellow fever.

The Quarantine station should be so located as to secure—1st. Ample and safe warehousing facilities, and convenient wharfage, at which all infected vessels might discharge their cargoes without delay, and without the hazardous and expensive practice of employing lighters and lightermen. 2d. Warehouses so situated and so constructed as to insure the best natural ventilation possible, added to appliances and power to afford to each store-loft the most complete provision for artificial ventilation and disinfection.* 3d. As absolutely indispensable to the safety of the public health of all cities and towns near the harbor of New-York, the Quarantine establishment and its anchorage for infected vessels must be so situated as to preclude the

* To ensure the greatest degree of efficiency and economy in the management of a Quarantine establishment, the lazaretto and the officers' residences should be located in as close proximity to the anchorage and warehouses as safety to the officers and to persons in Quarantine would permit. But it should be borne in mind, that the yellow fever, in our latitude, has never been known to be communicated from the sick, or from hospital wards, or from any other apartments or buildings beyond the limits of territory known to be otherwise infected. There is no doubt on this point among physicians who have fully investigated the subject.

It is absurd to apply the term "*pest-houses*" to the Quarantine hospitals, unless it refers to other diseases than yellow fever. Yellow fever has never been known to extend from any hospital in the United States; and as to all other diseases, we know that perfect immunity is enjoyed at the distance of a few hundred feet.

E. H.

possibility of clandestine and accidental intercourse with the sources of infection. They must also be so far removed from the ordinary track of vessels and commercial intercourse from any quarter, and so far distant from any city or populous community, as to prevent, as far as human wisdom and devices can prevent, the possibility of any transmission of infection beyond the jurisdiction of the Quarantine grounds and anchorage.

The foregoing desiderata attained, with faithful and intelligent officers in control of such a Quarantine establishment for the port of New-York, our Quarantine system would become what that department of our sanitary regulations should be—the means of the greatest possible protection from imported infection to the harbor of New-York and its populous environs, and producing, at the same time, the least possible embarrassment, with scarcely any extra expense or delay to the ordinary transactions of commerce.*

At the present Quarantine station none of these essential requisites for a suitable Quarantine establishment can ever be attained, so long as the existing laws and habits of infectious diseases continue; nor is there a point within ten miles of that station, where nature has furnished the appropriate conditions for such an establishment.

A beneficent Providence has provided at the narrow peninsula of Sandy Hook, every facility and natural condition requisite for the establishment of a protective and convenient Quarantine, and until that place, or some other point equally remote and as capable of complete isolation, shall be secured for the purpose, and provided with suitable wharves and warehouses, neither the

* Commerce need not suffer even from the most rigorous restrictions necessary for a protective Quarantine. Samples of any kind of merchandise in Quarantine, might, at very small expense, be completely disinfected by cold, or by some other means, and as is usually the case with goods in bond, the sales, transfers, etc., be effected at pleasure without loss or delay.

Infected vessels after discharging their cargoes and after suitable cleansing, might safely be permitted to proceed to their ports of previous departure, or to ports far north or very distant if manned with seasoned or acclimated seamen; a voyage at sea, with a cargo incapable of perpetuating infection, or, what is better, without cargo, being the best means of complete disinfection. And the fewer the vessels that remain at the Quarantine anchorage, the better for the public safety as well as for the interests of commerce.

city of New-York nor any town within twenty miles of the harbor, and near its level, can be insured from the importation of yellow fever.

Sensible of the peculiar difficulties that must be experienced in the determination of the questions which present themselves to your honorable Commission in this examination, I beg leave, gentlemen, to express the hope, that in the light of such great facts and general principles as are known, and with the cordial co-operation of sister States and communities equally interested in the final results of your efforts, you may be enabled to provide for the port of New-York, a Quarantine establishment that will at once ensure the fullest possible protection from the dangers of imported infection, and afford the greatest practicable security and relief to the commercial interests affected by the necessary restrictions of Quarantine.

With sentiments of high regard,

I have the honor to remain,

Very respectfully yours,

ELISHA HARRIS,

Late Physician-in-chief of the Quarantine Hospital.

253 FOURTH AVENUE, *New-York*, Jan. 27, 1858.





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